ONLINE APPENDICES

To Article:

Coupling Labor Codes of Conduct and Supplier Labor Practices:

The Role of Internal Structural Conditions

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Appendix A. Descriptive Tables and Interaction Graphs

Table A1. Industry Composition of Audits and Audited Suppliers

Industry	Audits		Suppliers	
	Number	Percent	Number	Percent
Hardlines	968	19.8%	631	19.3%
Apparel	899	18.4%	614	18.7%
Electronics	414	8.5%	277	8.5%
Housewares	334	6.8%	214	6.5%
Textiles	329	6.7%	235	7.2%
Toys	328	6.7%	222	6.8%
Food	224	4.6%	140	4.3%
Accessories	227	4.6%	170	5.2%
Personal Use Items	195	4.0%	141	4.3%
Footwear	157	3.2%	106	3.2%
Automotive	117	2.4%	70	2.1%
Sports Equipment	110	2.3%	71	2.2%
Leather Goods	104	2.1%	80	2.4%
Paper Products	88	1.8%	63	1.9%
Bottling	69	1.4%	42	1.3%
Technical Services	28	0.6%	22	0.7%
Other	296	6.1%	178	5.4%
Total	4,887	100%	3,276	100%

Table A2. Location of Audits and Audited Suppliers

Location of audits	Audits		Suppliers	
	Number	Percent	Number	Percent
China	3,732	76.4%	2,456	77.0%
India	174	3.6%	129	3.9%
Cambodia	136	2.8%	77	2.4%
Vietnam	128	2.6%	93	2.8%
Indonesia	108	2.2%	61	1.9%
Taiwan	90	1.8%	66	2.0%
Italy	88	1.8%	71	2.2%
Thailand	85	1.7%	57	1.7%
South Korea	52	1.1%	34	1.0%
Turkey	36	0.7%	27	0.8%
Mexico	35	0.7%	30	0.9%
Sri Lanka	20	0.4%	10	0.3%
Bangladesh	16	0.3%	13	0.4%
Egypt	16	0.3%	11	0.3%
Guatemala	15	0.3%	12	0.4%
United States	15	0.3%	12	0.4%
Countries with <15 audits in sample	141	2.9%	117	3.6%
Total	4,887	100%	3,276	100%

Table A3. Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Improvement	1															
2 Certification (prior audit)	-0.01	1														
3 Workers' union (prior audit)	0.02	0.17	1													
4 Piece-rate payment (prior audit)	0.02	0.05	0.12	1												
5 Labor practice score (prior audit)	-0.57	0.07	0.04	-0.14	1											
6 Paid by buyer (prior audit)	0.00	-0.03	0.01	-0.03	0.07	1										
7 Paid by buyer (focal audit)	-0.01	-0.04	0.00	-0.04	0.08	0.74	1									
8 All-female team (prior audit)	0.02	0.01	-0.03	0.01	-0.07	-0.03	-0.03	1								
9 All-female team (focal audit)	0.03	0.00	-0.01	0.02	-0.06	-0.02	-0.02	0.19	1							
10 Mixed-gender team (prior audit)	0.05	0.03	0.10	0.00	0.00	0.09	0.08	-0.29	-0.04	1						
11 Mixed-gender team (focal audit)	-0.12	0.03	0.11	0.02	0.10	0.04	0.07	-0.06	-0.27	0.24	1					
12 Audit team average age (prior audit)	0.01	0.01	-0.02	-0.05	0.11	-0.08	-0.09	-0.10	-0.03	-0.03	-0.03	1				
13 Audit team average age (focal audit)	-0.01	0.01	-0.01	-0.05	0.13	-0.08	-0.09	-0.01	-0.12	-0.01	.000	0.46	1			
14 Audit team maximum tenure (prior audit)	0.05	0.00	0.02	-0.02	0.00	-0.03	-0.03	-0.09	-0.03	0.16	0.08	0.55	0.22	1		
15 Audit team maximum tenure (focal audit)	-0.06	-0.02	0.03	-0.03	0.09	-0.05	-0.04	-0.01	-0.11	0.08	0.15	0.25	0.59	0.33	1	
16 Audit sequence	-0.09	0.05	0.07	-0.01	0.13	0.05	0.07	0.01	0.00	0.03	0.07	0.01	0.01	0.04	0.05	1
17 Supplier's size (prior audit) [L]	-0.01	0.24	0.33	0.11	0.03	0.00	-0.02	-0.08	-0.03	0.37	0.33	-0.10	-0.11	0.08	0.03	0.12
18 Supplier's age (prior audit) [L]	-0.03	0.14	0.16	0.02	0.08	-0.08	-0.08	-0.04	-0.01	0.05	0.05	0.13	0.10	0.07	0.07	0.14
19 Female worker ratio (prior audit)	-0.01	-0.05	0.03	0.03	0.06	0.13	0.13	0.04	0.02	0.00	0.00	-0.13	-0.13	-0.03	-0.01	0.01
20 Local worker ratio (prior audit)	0.03	0.03	0.13	0.01	0.11	0.11	0.09	-0.03	-0.05	0.00	0.00	0.14	0.13	0.04	0.03	-0.01
21 Use subcontractors (prior audit)	0.04	0.00	0.06	0.08	-0.04	0.07	0.06	0.01	-0.01	0.01	0.03	0.00	-0.02	-0.01	-0.02	0.00

|	17	18	19	20	21
17 Supplier's size (prior audit) [L]	1				
18 Supplier's age (prior audit) [L]	0.17	1			
19 Female worker ratio (prior audit)	-0.02	-0.07	1		
20 Local worker ratio (prior audit)	-0.03	0.10	0.14	1	
21 Use subcontractors (prior audit)	0.05	-0.02	0.06	0.05	1

N = 4,887; [L] indicates logged.

Interactions among Efficiency Structures and Managerial Structures

Figure A1.   Suppliers with piece-rate payment schemes improve less on average, but the gap is significantly smaller among certified suppliers. Suppliers with certified management systems improve more on average, but the gap is significantly smaller among piece-rate payment suppliers.
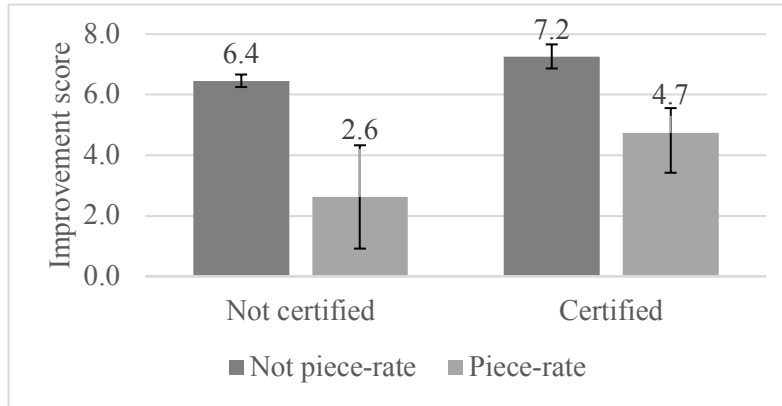
Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 2 in Table 2.

Figure A2.   Suppliers with piece-rate payment schemes improve less on average, but the gap is significantly smaller among unionized suppliers. Suppliers with workers' unions improve more on average, but the gap is significantly smaller among piece-rate payment suppliers.
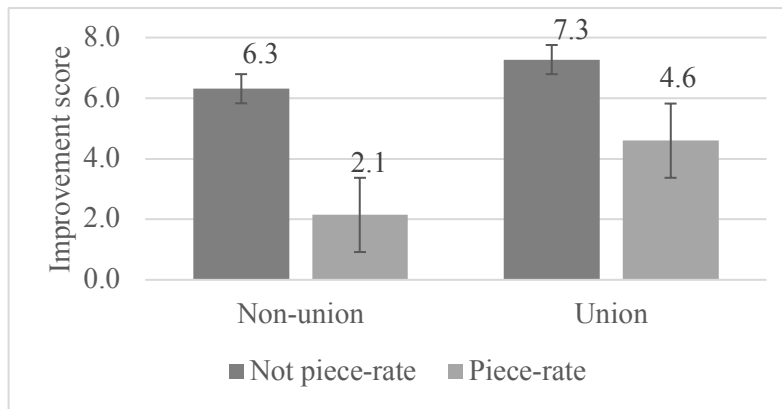
Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 3 in Table 2.

Figure A3.   Among unionized suppliers, certified suppliers improvement significantly more than not-certified suppliers. Among certified suppliers, unionized suppliers improve significantly more than non-unionized suppliers.

Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 4 in Table 2.

Appendix B. Interpreting Control Variables in Table 2

Table B1 Improvement Regression Coefficients on Industries and Supplier Countries from the Model Reported in Column 1 of Table 2.

Apparel	-1.337**	Hardlines	-2.830***	Technical Services	-4.932*
	(0.405)		(0.542)		(2.318)
Automotive	1.187	Housewares	-3.080***	Sports Equipment	-3.123***
	(0.770)		(0.503)		(0.525)
Bottling	-3.100**	Leather Goods	-4.173***	Textiles	-0.674
	(1.080)		(1.174)		(0.792)
Electronics	-2.666***	Paper Products	0.038	Toys	-2.308***
	(0.650)		(0.672)		(0.523)
Food	-1.392+	Personal Use Items	-1.654*	Other	-1.813*
	(0.802)		(0.657)		(0.731)
Footwear	-3.549***				
	(0.906)				
Argentina	-3.286***	Honduras	3.744*	Portugal	14.719***
	(0.642)		(1.499)		(0.914)
Bangladesh	4.732***	Hong Kong	12.073***	Romania	9.767***
	(0.547)		(0.841)		(0.795)
Belgium	4.049**	Hungary	1.134	Russia	7.088**
	(1.347)		(2.551)		(2.043)
Brazil	18.806***	India	5.955***	Singapore	-3.541***
	(0.871)		(0.435)		(0.734)
Bulgaria	14.627***	Indonesia	-0.561	Slovenia	12.023***
	(0.758)		(0.491)		(1.162)
Cambodia	3.469***	Italy	11.173***	South Africa	-4.586***
	(0.241)		(0.926)		(0.711)
Canada	10.011***	Jordan	-7.813***	South Korea	1.997***
	(1.746)		(0.596)		(0.410)
Chile	12.233***	Kenya	11.169***	Spain	11.539***
	(0.836)		(0.537)		(0.730)
Colombia	24.939***	Lebanon	1.328	Sri Lanka	8.456***
	(1.577)		(0.857)		(0.572)
Czech Republic	13.998***	Malaysia	10.818***	Sweden	18.862***
	(0.969)		(0.894)		(2.034)
Dominican Republic	4.576***	Mauritius	4.511***	Switzerland	12.893***
	(0.648)		(0.913)		(0.879)
Egypt	-1.019	Mexico	5.885***	Taiwan	4.209***
	(0.691)		(0.290)		(0.470)
El Salvador	3.048***	Netherlands	12.488***	Thailand	9.294***
	(0.558)		(1.522)		(0.344)
Finland	16.779***	New Zealand	15.591***	Tunisia	1.847
	(2.171)		(1.061)		(1.833)
France	10.485***	Pakistan	9.622***	Turkey	2.962***
	(0.616)		(0.810)		(0.828)
Germany	11.630***	Peru	0.831+	UK	6.696***
	(0.748)		(0.459)		(0.747)
Greece	-3.916***	Philippines	13.502***	United States	9.545***
	(0.496)		(0.933)		(0.483)
Guatemala	4.362***	Poland	10.330***	Vietnam	5.298***
	(0.267)		(0.490)		(0.351)

Notes: The baseline industry is Accessories; the baseline country is China. See the paper's Table 2 for remaining notes.

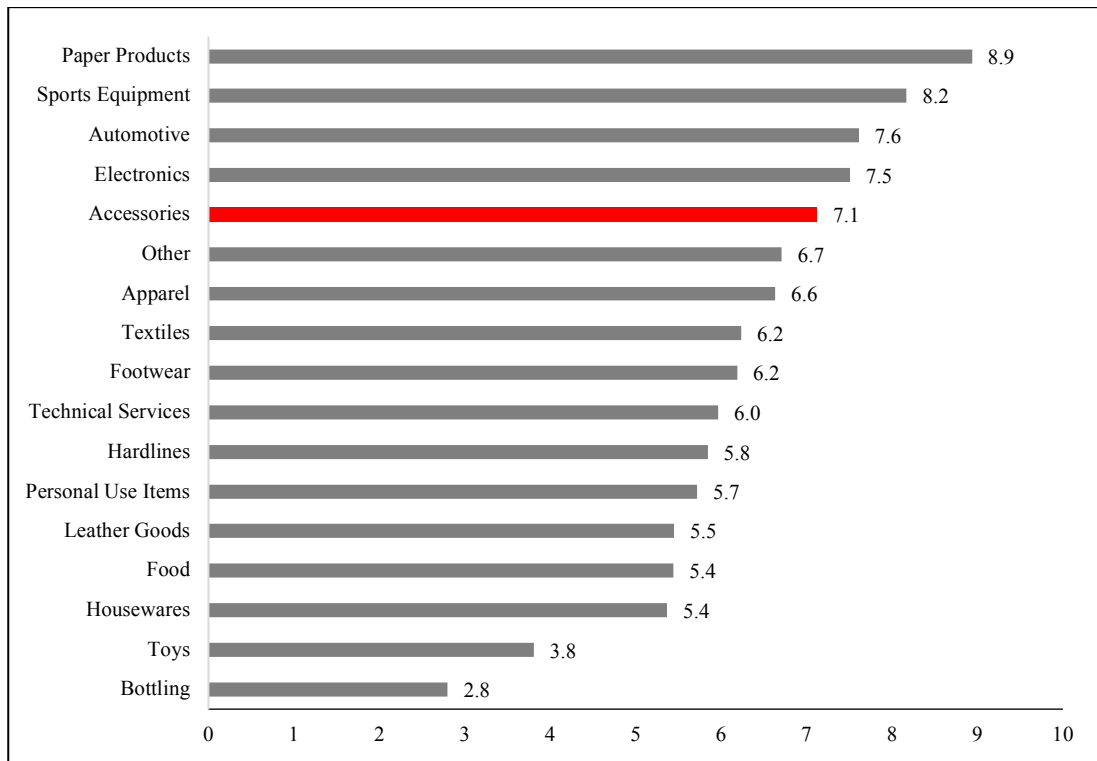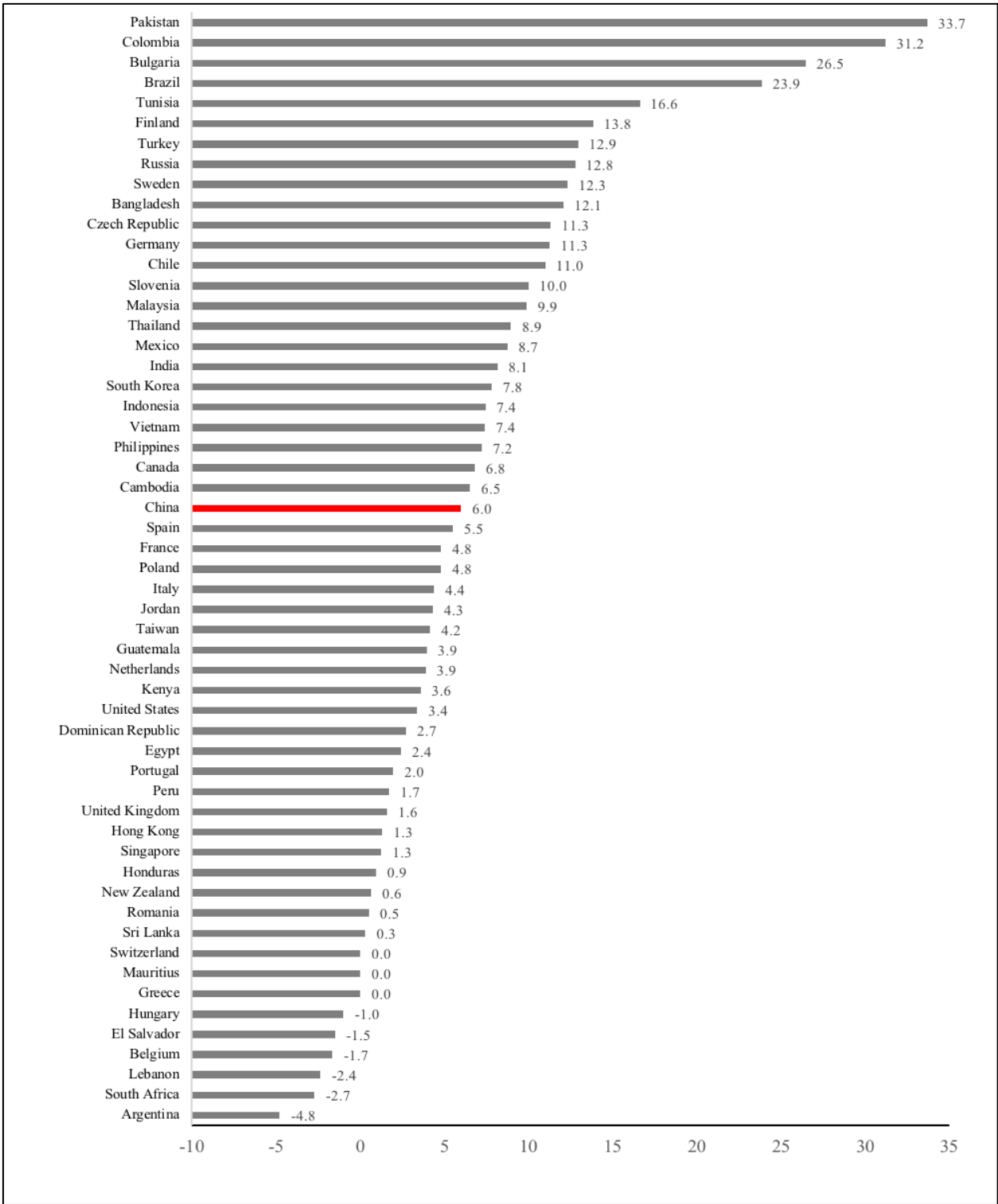**Figure B1. Average Improvement among Suppliers by Industry (Descriptive)**

Industry	Value
Paper Products	8.9
Sports Equipment	8.2
Automotive	7.6
Electronics	7.5
Accessories	7.1
Other	6.7
Apparel	6.6
Textiles	6.2
Footwear	6.2
Technical Services	6.0
Hardlines	5.8
Personal Use Items	5.7
Leather Goods	5.5
Food	5.4
Housewares	5.4
Toys	3.8
Bottling	2.8

Figure B2. Average Improvement among Suppliers by Country (Descriptive)

Country	Value
Pakistan	33.7
Colombia	31.2
Bulgaria	26.5
Brazil	23.9
Tunisia	16.6
Finland	13.8
Turkey	12.9
Russia	12.8
Sweden	12.3
Bangladesh	12.1
Czech Republic	11.3
Germany	11.3
Chile	11.0
Slovenia	10.0
Malaysia	9.9
Thailand	8.9
Mexico	8.7
India	8.1
South Korea	7.8
Indonesia	7.4
Vietnam	7.4
Philippines	7.2
Canada	6.8
Cambodia	6.5
China	6.0
Spain	5.5
France	4.8
Poland	4.8
Italy	4.4
Jordan	4.3
Taiwan	4.2
Guatemala	3.9
Netherlands	3.9
Kenya	3.6
United States	3.4
Dominican Republic	2.7
Egypt	2.4
Portugal	2.0
Peru	1.7
United Kingdom	1.6
Hong Kong	1.3
Singapore	1.3
Honduras	0.9
New Zealand	0.6
Romania	0.5
Sri Lanka	0.3
Switzerland	0.0
Mauritius	0.0
Greece	0.0
Hungary	-1.0
El Salvador	-1.5
Belgium	-1.7
Lebanon	-2.4
South Africa	-2.7
Argentina	-4.8

Appendix C. Robustness Tests

Assessing the impact of including announcement information

The auditing company that provided our data only began recording announcement information in 2014, midway through our sample period. To explore whether omitting this information biased our results, we estimate our model on the subsample of audits conducted in 2014 and 2015, for which the announcement data was available. To provide a basis for comparison, we re-estimated our primary model during this same period and report the results as Model 1 in Table C1. We then estimated the model including the two dummy variables, *announced (prior audit)* and *announced (focal audit)*, in Model 2 in Table C1.

Overall, these two models yield very similar coefficients, magnitudes, and standard errors. Wald tests comparing our hypothesized coefficients across these models indicated no significant difference between the *certification* coefficients *(prior audit)* (Wald $\chi^2 = 0.23$, p $= 0.63$) or between the *workers' union (prior audit)* coefficients (Wald $\chi^2 = 0.03$, p $= 0.86$). The coefficient magnitude on *piece-rate payment (prior audit)* declined by a slight 2.6% in the model that included announcement status (where 2% is calculated as -2.9 - (-2.8)] / (-2.9)). This was statistically significant (Wald $\chi^2 = 7.29$, p $= 0.01$), suggesting that omitting announcement status in our primary models might cause us to slightly underestimate the deleterious effect of piece-rate payment on improvement in labor practices.

Assessing the impact of including the time gap between audits

Because improvement might depend on the amount of time between the prior and focal audits, which our primary models do not account for, we estimate our models identical to our primary models except we predict *improvement per month*, which ranges from -1.4 to 6.5 and averages 1.5 (S.D. $= 2.5$). In our sample, the time gap between two audits for a supplier ranges from 2.4 months to 14.5 months with an average of 9 months. The results of these models (see Table C2), which explicitly account for the amount of time between the prior and focal audits, continued to yield statistically significant coefficients of the same sign on most hypothesized effects, except for H3a. One possible explanation is that in

factories with efficiency incentives, the long-term benefits of a certified management system in tempering efficiency demands are more likely to be salient when the time gap between audits is greater.

Assessing the impact of buyer power

Our primary models include buyer-country fixed effects, but it is possible that improvement might differ across particular buyers, which might influence our hypothesized relationships. Specifically, buyers might differ in their potential to exert coercive pressure on suppliers to improve and that this might be correlated with variables in our model in ways that result in biased estimates. We pursued two approaches to assess this. We calculate the total number of supplier factories audited for each buyer as an imperfect proxy for buyer size, with the assumption that larger buyers have more supplier factories audited. (We opted to create a single count rather than an annual count to avoid noise). We include this variable and its square (to provide a more flexible functional form) as a control variable in our models. We alternatively include the log of this variable in our models. All of these specifications yielded results nearly identical to those of our original models, as reported below in Table C3 and C4.

Assessing models that predict labor practice score as opposed to the score difference

We pursued two approaches to assess whether our primary results are robust to two potential issues associated with models that predict difference or change scores. First, all models (including ours) that predict a difference score while controlling for the lagged score assume there is no contemporaneous correlation between the lagged score and the error term (that is, between $y_{i,t-1}$ and $\varepsilon_{i,t}$). As a robustness test, we estimated an alternative set of models that predict $\ln(y_{i,t}/y_{i,t-1})$, which is a different functional form of improvement. This logged ratio is an outlier-robust approximation of a percent change (that is, it is less prone to outliers than $\Delta y_i/y_{i,t-1}$). When we predict this outcome, we still control for the baseline score because suppliers with lower prior scores have more room for improvement—and might face less-expensive improvement opportunities—than suppliers that already had superior labor practices. In this model, we control for $\ln(y_{i,t-1})$ instead of $y_{i,t-1}$, which imposes a different assumption from that of our main model. Whereas our primary model assumes no contemporaneous correlation between the lagged score

($y_{i,t-1}$) and the error term ($\varepsilon_{i,t}$) resulting from predicting Δy_i conditional on $y_{i,t-1}$, this alternative model assumes no contemporaneous correlation between the lagged log score ($\ln(y_{i,t-1})$) and the error term ($\varepsilon_{i,t}$) resulting from predicting $\ln(y_{i,t}/y_{i,t-1})$ conditional on $\ln(y_{i,t-1})$. This alternative specification supports all of our hypotheses, just like our primary approach (reported in Table C5 below).

Second, a separate concern about models like ours that include a current and lagged variable (in our case, both $y_{i,t}$ and $y_{i,t-1}$) might be that the error structure is autocorrelated (that is, $\varepsilon_{i,t}$ might be correlated with $\varepsilon_{i,t-1}$). This is more of a concern for long panels (over 20–30 panels) and is less of a problem for short panels Automatic citation updates are disabled. To see the bibliography, click Refresh in the Zotero tab.. Cameron and Trivedi (2010: 336) also note, "In microeconometrics analysis, panel data have a time-series component. For short panels covering few time periods, there is no need to use HAC estimates." HAC estimation refers to heteroscedasticity- and autocorrelation-consistent estimation. For our dataset, the number of audit sequence is small (maximum audit sequence=6), and the number of factories is large (n>3,000). Thus, we believe this issue is not a severe concern for our data. In addition, to address the autocorrelation concern, researchers report standard errors clustered by firms, which are unbiased (Peterson, 2009). For our circumstance, because factories are nested in countries, we report standard errors clustered by supplier countries. Clustering by the larger group (country) is more conservative than clustering by the smaller group (factory). Standard errors clustered by the larger group will be larger than the standard errors clustered by the smaller group (Cameron and Miller 2011, 2015).

Assessing within-supplier variations

We examine whether our hypothesized relationships manifest *within* suppliers when they decide to change their use of piece rate payment or change their certification or unions status. We created a set of supplier fixed-effects models. These models use *labor practice score* as the dependent variable (instead of change in labor practice scores) and do not control for lagged scores (to avoid dynamic panel concerns that are infeasible to address in our short panel with approaches such as Arellano-Bond estimators that

rely on several-period lags as instruments). This supplier fixed effects model seeks to identify whether labor practice scores are affected by within-supplier *changes* in *piece rate payment*, *workers' union*, or *certification* status. Thus, whereas the sample used in our primary analysis omits establishments that changed in any of these dimensions to avoid potential endogeneity concerns, we expand the sample to estimate the supplier fixed-effects models to include establishments that experienced a change in any of these three dimensions during our sample period. Note that these models do not precisely test our hypotheses and are vulnerable to endogeneity bias associated with suppliers' endogenous decisions to make those changes. We do not report the results table from these analyses to avoid mis-interpretation that these coefficients indicate causal relationships.

This set of supplier fixed-effects models yield findings that are mostly consistent with our general theoretical accounts: *changing* to piece-rate payment is associated with statistically significant declines in labor practice scores, whereas *becoming* certified or unionized are associated with statistically significant increases in *labor practice scores*. These findings, like those from our primary models, are consistent with H1, H2a, and H2b.

We also find being certified to a management system standard attenuates the negative association between piece-rate payment and improvement, but this difference is just outside conventional thresholds for statistical significance. This is inconsistent with H3a. Furthermore, when suppliers change to piece-rate payment, those who do so without also becoming unionized have statistically lower labor practice scores than those that also become unionized, consistent with H3b.We also test the inverse relationship as depicted in H3c and H3d that efficiency structures can temper managerial structures. When suppliers become unionized or certified, those who do so without also changing to piece-rate payment have lower labor practice scores than those that also change to piece-rate payment. So these results are consistent with H3c and H3d.

We also find support for H4a and H4b. When factories become unionized, those who do so without also becoming certified have significantly lower labor practice scores than those that also become certified, consistent with H4a. When factories become certified, those who do so without also becoming

unionized have significantly lower labor practice scores than those that also become unionized, consistent with H4b. These findings are consistent with our arguments that unions and certifications are complementary, rather than substitutive.

In conclusion, this set of supplier fixed-effects models yield results that are largely consistent with our main models, which is remarkable given these models do not precisely test our hypotheses and the coefficients on the hypothesized variables are identified by a completely different set of suppliers (those that change their status regarding piece-rate payment, certifications, and unions). As such, these models increase the external validity of our theory.

Table C1. Regression Results

Dependent variable: *Improvement*	Omits announcement (1)	Includes announcement (2)
Piece-rate payment (prior audit)	-2.832***	-2.906***
	(0.634)	(0.653)
Certification (prior audit)	1.783***	1.765***
	(0.498)	(0.499)
Workers' union (prior audit)	0.046	0.049
	(0.242)	(0.250)
Labor practice score (prior audit)	-0.601***	-0.601***
	(0.017)	(0.017)
Announced (prior audit)		-1.522***
		(0.402)
Announced (focal audit)		-0.608
		(0.841)
Paid by buyer (prior audit)	1.912***	1.567***
	(0.345)	(0.328)
Paid by buyer (focal audit)	-0.959*	-1.052*
	(0.356)	(0.473)
All-female team (prior audit)	-0.313	-0.297
	(0.444)	(0.428)
All-female team (focal audit)	0.001	-0.007
	(0.411)	(0.412)
Mixed-gender team (prior audit)	2.027***	1.932***
	(0.403)	(0.405)
Mixed-gender team (focal audit)	-4.782***	-4.751***
	(0.571)	(0.579)
Audit team average age (prior audit)	-0.113**	-0.109**
	(0.037)	(0.037)
Audit team average age (focal audit)	0.141***	0.141***
	(0.037)	(0.036)
Audit team maximum tenure (prior audit)	0.234**	0.230**
	(0.069)	(0.070)
Audit team maximum tenure (focal audit)	-0.263*	-0.262*
	(0.113)	(0.113)
Supplier's size (prior audit) [L]	-0.160	-0.173
	(0.126)	(0.127)
Supplier's age (prior audit) [L]	-0.291	-0.295
	(0.224)	(0.221)
Female worker ratio (prior audit)	5.337***	5.334***
	(0.701)	(0.732)
Local worker ratio (prior audit)	-0.787**	-0.818**
	(0.291)	(0.290)
Use subcontractors (prior audit)	-0.653	-0.597
	(0.465)	(0.441)
Observations	2,033	2,033
R-squared	0.4505	0.4513

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. Model 1 is estimated on the sample from 2014 to 2015 without the announcement information; Model 2 is estimated on the same sample, but includes the announcement information. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$ (two-tailed tests). [L] indicates logged.

Table C2. Regression Results

Dependent variable: *Improvement per month*	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-0.563***	-0.549***	-0.655***	-0.565***
	(0.102)	(0.111)	(0.106)	(0.104)
Certification (prior audit)	0.169***	0.179***	0.166***	0.100+
	(0.040)	(0.041)	(0.040)	(0.052)
Workers' union (prior audit)	0.253***	0.254***	0.219***	0.217***
	(0.037)	(0.038)	(0.044)	(0.045)
Piece-rate payment (prior audit) × Certification (prior audit)		-0.072		
		(0.075)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			0.236**	
			(0.071)	
Certification (prior audit) × Workers' union (prior audit)				0.172*
				(0.069)
Labor practice score (prior audit)	-0.090***	-0.090***	-0.090***	-0.090***
	(0.001)	(0.001)	(0.001)	(0.001)
Paid by buyer (prior audit)	0.107*	0.107*	0.105+	0.108*
	(0.053)	(0.053)	(0.054)	(0.053)
Paid by buyer (focal audit)	0.113	0.114	0.113	0.114
	(0.121)	(0.121)	(0.121)	(0.121)
All-female team (prior audit)	0.016	0.016	0.018	0.014
	(0.024)	(0.024)	(0.024)	(0.024)
All-female team (focal audit)	-0.086	-0.086	-0.085	-0.087
	(0.060)	(0.059)	(0.060)	(0.059)
Mixed-gender team (prior audit)	0.501***	0.500***	0.506***	0.504***
	(0.136)	(0.137)	(0.136)	(0.136)
Mixed-gender team (focal audit)	-0.985***	-0.985***	-0.985***	-0.983***
	(0.150)	(0.150)	(0.149)	(0.150)
Audit team average age (prior audit)	-0.002	-0.002	-0.002	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)
Audit team average age (focal audit)	0.015**	0.015**	0.015**	0.015**
	(0.005)	(0.005)	(0.005)	(0.005)
Audit team maximum tenure (prior audit)	0.059***	0.059***	0.059***	0.059***
	(0.015)	(0.014)	(0.014)	(0.014)
Audit team maximum tenure (focal audit)	-0.048***	-0.048***	-0.048***	-0.048***
	(0.012)	(0.012)	(0.012)	(0.012)
Supplier's size (prior audit) [L]	0.045*	0.045*	0.046*	0.046*
	(0.019)	(0.019)	(0.019)	(0.019)
Supplier's age (prior audit) [L]	-0.035	-0.036	-0.034	-0.035
	(0.026)	(0.026)	(0.026)	(0.026)
Female worker ratio (prior audit)	0.411***	0.409***	0.408***	0.418***
	(0.115)	(0.114)	(0.114)	(0.116)
Local worker ratio (prior audit)	-0.051*	-0.051*	-0.047*	-0.054*
	(0.021)	(0.021)	(0.022)	(0.021)
Use subcontractors (prior audit)	-0.013	-0.013	-0.011	-0.013
	(0.091)	(0.092)	(0.092)	(0.092)
Observations	4,887	4,887	4,887	4,887
R-squared	0.3883	0.3883	0.3884	0.3884

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$, (two-tailed tests). [L] indicates logged.

Table C3 Regression Results Controlling for Buyer Size

	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-3.600***	-3.634***	-3.804***	-4.186***
	(0.865)	(0.897)	(0.929)	(0.824)
Certification (prior audit)	0.987***	-0.199	0.848***	0.967***
	(0.183)	(0.416)	(0.225)	(0.182)
Workers' union (prior audit)	1.173***	0.552*	1.163***	0.957***
	(0.126)	(0.244)	(0.131)	(0.115)
Piece-rate payment (prior audit) × Certification (prior audit)		2.934**		
		(0.904)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			1.066+	
			(0.609)	
Certification (prior audit) × Workers' union (prior audit)				1.505**
				(0.489)
Labor practice score (prior audit)	-0.600***	-0.601***	-0.601***	-0.601***
	(0.007)	(0.007)	(0.007)	(0.007)
Paid by buyer (prior audit)	0.072	0.084	0.076	0.056
	(0.239)	(0.233)	(0.239)	(0.241)
Paid by buyer (focal audit)	0.025	0.060	0.027	0.022
	(1.041)	(1.042)	(1.044)	(1.043)
All-female team (prior audit)	-0.153	-0.184	-0.158	-0.139
	(0.215)	(0.214)	(0.214)	(0.214)
All-female team (focal audit)	-0.559*	-0.576*	-0.558*	-0.557*
	(0.220)	(0.218)	(0.219)	(0.222)
Mixed-gender team (prior audit)	1.743*	1.792*	1.749*	1.778*
	(0.703)	(0.706)	(0.701)	(0.701)
Mixed-gender team (focal audit)	-4.129***	-4.098***	-4.128***	-4.128***
	(0.737)	(0.725)	(0.734)	(0.732)
Audit team average age (prior audit)	-0.079	-0.084	-0.080	-0.077
	(0.048)	(0.050)	(0.048)	(0.049)
Audit team average age (focal audit)	0.108**	0.107**	0.108**	0.108**
	(0.037)	(0.037)	(0.037)	(0.038)
Audit team maximum tenure (prior audit)	0.309***	0.309***	0.310***	0.306***
	(0.056)	(0.056)	(0.056)	(0.056)
Audit team maximum tenure (focal audit)	-0.300***	-0.303***	-0.299***	-0.301***
	(0.066)	(0.065)	(0.066)	(0.065)
Supplier's size (prior audit) [L]	0.243+	0.251+	0.245+	0.247+
	(0.123)	(0.129)	(0.124)	(0.123)
Supplier's age (prior audit) [L]	-0.017	-0.010	-0.016	-0.006
	(0.153)	(0.151)	(0.154)	(0.152)
Female worker ratio (prior audit)	4.015***	4.138***	4.041***	3.999***
	(0.377)	(0.383)	(0.373)	(0.373)
Local worker ratio (prior audit)	-0.365***	-0.419***	-0.366***	-0.338***
	(0.098)	(0.101)	(0.099)	(0.097)
Use subcontractors (prior audit)	0.017	0.026	0.009	0.031
	(0.690)	(0.695)	(0.689)	(0.692)
Total number of facilities audited for each buyer	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Total number of facilities audited for each buyer squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$, (two-tailed tests). [L] indicates logged

Table C4 Regression Results Controlling for Buyer Size

	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-3.565***	-3.600***	-3.819***	-4.148***
	(0.845)	(0.879)	(0.904)	(0.821)
Certification (prior audit)	0.998***	-0.218	0.825***	0.979***
	(0.183)	(0.408)	(0.224)	(0.180)
Workers' union (prior audit)	1.212***	0.574*	1.200***	0.997***
	(0.127)	(0.261)	(0.132)	(0.123)
Piece-rate payment (prior audit) × Certification (prior audit)		3.008**		
		(0.938)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			1.326*	
			(0.608)	
Certification (prior audit) × Workers' union (prior audit)				1.498**
				(0.476)
Labor practice score (prior audit)	-0.603***	-0.603***	-0.603***	-0.603***
	(0.006)	(0.006)	(0.007)	(0.006)
Paid by buyer (prior audit)	0.083	0.095	0.087	0.067
	(0.256)	(0.248)	(0.256)	(0.258)
Paid by buyer (focal audit)	0.309	0.339	0.305	0.305
	(0.910)	(0.916)	(0.913)	(0.911)
All-female team (prior audit)	-0.131	-0.164	-0.139	-0.118
	(0.218)	(0.217)	(0.217)	(0.218)
All-female team (focal audit)	-0.574*	-0.591**	-0.572*	-0.571*
	(0.219)	(0.217)	(0.219)	(0.221)
Mixed-gender team (prior audit)	1.677*	1.728*	1.686*	1.712*
	(0.682)	(0.686)	(0.680)	(0.682)
Mixed-gender team (focal audit)	-4.262***	-4.228***	-4.260***	-4.261***
	(0.757)	(0.744)	(0.754)	(0.752)
Audit team average age (prior audit)	-0.075	-0.080	-0.075	-0.073
	(0.049)	(0.051)	(0.049)	(0.050)
Audit team average age (focal audit)	0.112**	0.110**	0.112**	0.112**
	(0.037)	(0.036)	(0.036)	(0.037)
Audit team maximum tenure (prior audit)	0.304***	0.304***	0.306***	0.302***
	(0.055)	(0.055)	(0.055)	(0.055)
Audit team maximum tenure (focal audit)	-0.303***	-0.306***	-0.302***	-0.304***
	(0.067)	(0.066)	(0.067)	(0.066)
Supplier's size (prior audit) [L]	0.286*	0.294*	0.288*	0.290*
	(0.133)	(0.139)	(0.133)	(0.133)
Supplier's age (prior audit) [L]	-0.003	0.004	-0.002	0.008
	(0.152)	(0.150)	(0.153)	(0.151)
Female worker ratio (prior audit)	3.795***	3.925***	3.829***	3.778***
	(0.385)	(0.392)	(0.382)	(0.381)
Local worker ratio (prior audit)	-0.320**	-0.375***	-0.321**	-0.292**
	(0.096)	(0.100)	(0.097)	(0.095)
Use subcontractors (prior audit)	0.051	0.060	0.041	0.066
	(0.684)	(0.690)	(0.682)	(0.686)
Total number of facilities audited for each buyer [L]	0.496	0.480	0.496	0.497
	(0.322)	(0.330)	(0.323)	(0.321)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer fixed effects are included. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10, [L] indicates logged.

Table C5. Regression Results Predicting Improvement ($\ln(y_{i,t}/y_{i,t-1})$)

DV= $\ln(y_{i,t}/y_{i,t-1})$.	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-0.057***	-0.058***	-0.063***	-0.069***
	(0.013)	(0.014)	(0.014)	(0.013)
Certification (prior audit)	0.014***	-0.004	0.010**	0.014***
	(0.003)	(0.005)	(0.003)	(0.003)
Workers' union (prior audit)	0.018***	0.008*	0.018***	0.014***
	(0.001)	(0.003)	(0.002)	(0.001)
Piece-rate payment (prior audit) × Certification (prior audit)		0.045**		
		(0.013)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			0.030**	
			(0.009)	
Certification (prior audit) × Workers' union (prior audit)				0.030***
				(0.007)
Labor practice score (prior audit) ($\ln(y_{i,t-1})$)	-0.607***	-0.607***	-0.607***	-0.607***
	(0.006)	(0.006)	(0.006)	(0.006)
Paid by buyer (prior audit)	0.001	0.001	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Paid by buyer (focal audit)	0.014*	0.014*	0.014*	0.014*
	(0.006)	(0.006)	(0.006)	(0.006)
All-female team (prior audit)	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
All-female team (focal audit)	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.003)
Mixed-gender team (prior audit)	0.023*	0.023*	0.023*	0.023*
	(0.011)	(0.011)	(0.011)	(0.011)
Mixed-gender team (focal audit)	-0.061***	-0.060***	-0.061***	-0.061***
	(0.011)	(0.010)	(0.011)	(0.011)
Audit team average age (prior audit)	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Audit team average age (focal audit)	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Audit team maximum tenure (prior audit)	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Audit team maximum tenure (focal audit)	-0.005***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Supplier's size (prior audit) [L]	0.004	0.004	0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Supplier's age (prior audit) [L]	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Female worker ratio (prior audit)	0.057***	0.059***	0.058***	0.057***
	(0.006)	(0.006)	(0.006)	(0.006)
Local worker ratio (prior audit)	-0.006***	-0.007***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Use subcontractors (prior audit)	0.001	0.001	0.001	0.001
	(0.008)	(0.008)	(0.008)	(0.008)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$ (two-tailed tests).

Appendix D. Supplementary Analysis

Table D1. Certification Frequency

Panel A

		Generative certifications				Total	
		No		Yes			
		Audits	Suppliers	Audits	Suppliers	Audits	Suppliers
Prescriptive	No	4,140	2,736	547	387	4,687	3,123
certifications	Yes	176	132	24	21	200	153
Total		4,316	2,868	571	408	4,887	3,276

Panel B

Prescriptive certifications			Generative certifications		
	Audits	Suppliers		Audits	Suppliers
ICTI	100	74	ISO 9001	421	306
SA8000	48	33	ISO 14001	283	202
WRAP	44	33	ISO Others	49	37
BSCI	8	8	OHSAS 18001	67	58
TLS	3	2	BRC	40	29
			HACCP	28	18
			GB	29	20
			IFS	17	13
			FSSC	2	1

Note: These tables report the number of audits and suppliers in our sample that have prescriptive and generative certifications. ICTI refers to International Council of Toy Industries. SA8000 refers to Social Accountability 8000. WRAP refers to Worldwide Responsible Accredited Production. BSCI refers to the Business Social Compliance Initiative. TLS refers to Thai Labor Standards. ISO 9001 is a Quality Management System Standard. ISO 14001 is an Environmental Management System Standard. Other ISO certifications include ISO TS 16949 (an application of the ISO 9001 Quality Management System Standard to the automotive industry), ISO 22000 (Food Safety Management System), ISO 27000 (Information Security Management System), and ISO 13485 (Quality Management System for Manufacturing Medical Device). OHSAS 18001 refers to US Occupational Health and Safety Assessment Series 18001. BRC refers to British Retail Consortium. HACCP refers to Hazard Analysis and Critical Control Points. GB includes GB/T 28000 (the Chinese equivalent of OHSAS 18001), GB/T 24000 (the Chinese equivalent of ISO 14000), and GT/T 19000 (the Chinese equivalent of ISO 9000). IFS refers to International Featured Standards. FSSC refers to Food Safety System Certification.

Table D2. Regression Results of Models Distinguishing Prescriptive and Generative Certification

	(1)	(2)
Dependent variable:	*Labor practice improvement*	*Labor practice level*
Prescriptive certification (prior audit)	0.453	
	(0.353)	
Prescriptive certification (focal audit)		1.657***
		(0.368)
Generative certification (prior audit)	1.059***	
	(0.273)	
Generative certification (focal audit)		1.828***
		(0.384)
Workers' union (prior audit)	1.165***	
	(0.126)	
Workers' union (focal audit)		1.107***
		(0.234)
Piece-rate payment (prior audit)	-3.594***	
	(0.838)	
Piece-rate payment (focal audit)		-6.382***
		(1.249)
Labor practice score (prior audit)	-0.603***	
	(0.006)	
Paid by buyer (prior audit)	0.171	
	(0.301)	
Paid by buyer (focal audit)	0.979*	2.149***
	(0.449)	(0.252)
All-female team (prior audit)	-0.141	
	(0.220)	
All-female team (focal audit)	-0.576*	-0.883***
	(0.217)	(0.213)
Mixed-gender team (prior audit)	1.668*	
	(0.706)	
Mixed-gender team (focal audit)	-4.290***	-3.385***
	(0.743)	(0.758)
Audit team average age (prior audit)	-0.074	
	(0.050)	
Audit team average age (focal audit)	0.115**	0.096*
	(0.038)	(0.041)
Audit team maximum tenure (prior audit)	0.307***	
	(0.056)	
Audit team maximum tenure (focal audit)	-0.307***	-0.272**
	(0.066)	(0.090)
Supplier's size (prior audit) [L]	0.286*	
	(0.133)	
Supplier's size (focal audit) [L]		1.013***
		(0.083)
Supplier's age (prior audit) [L]	-0.013	
	(0.153)	
Supplier's age (focal audit) [L]		0.248
		(0.253)
Female worker ratio (prior audit)	3.876***	
	(0.382)	
Female worker ratio (focal audit)		3.460***
		(0.829)
Local worker ratio (prior audit)	-0.384***	
	(0.096)	
Local worker ratio (focal audit)		-0.688***
		(0.182)
Use subcontractors (prior audit)	0.011	
	(0.670)	
Use subcontractors (focal audit)		-1.081
		(0.664)

Note: OLS regression coefficients with standard errors clustered by supplier country in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$ (two-tailed tests). All models also include fixed effects for industry, year, audit sequence, supplier country, and buyer country. For all models, N=4,887. L indicates logged.